PATENT
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IN THE U.S. PATENT AND TRADEMARK OFFICE

In re application of

Alain LECOMPTE — Conf. 2996

Application No. 10/554,282 — Group 1638

Filed October 25, 2005 — Examiner M. Ibrahim

METHOD FOR OBTAINING RECOMBINANT PLANTS OF THE CICHORIUM GENUS AND PLANTS THUS OBTAINED

DECLARATION OF ALAIN LECOMPTE UNDER 37 C.F.R. §1.1.32

Assistant Commissioner for Patents
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Sir:

I, Alain LECOMPTE, hereby declare as follows:

1. I am the sole inventor named of the above-identified U.S. application, and as the sole inventor I am familiar with the whole subject matter that is described and claimed therein.

2. My relevant background and experience is as follows:

I received an Engineer degree from the French National Horticultural School and an MsC in genetic and plant breeding from the ORSAY University of Paris in 1984.

From 1984 to 1986, I was employed by the French National Institute for Agricultural Research (INRA) as Corn breeder.

I have been employed by Vilmorin as a plant breeder since 1986. During these years I have been a pea, a cucumber, a radish and a chicory breeder for Vilmorin. Among these species, I successfully bred several new plant varieties that now lead the European Chicory market such as PLATINE, ZILIA, CRENOLINE, ECRINE & OMBLINE.

3. I have carefully studied and I am familiar with the Final Office action dated of December 23, 2008.

4. I understand that the Examiner has rejected the present invention as being obvious over the combination of SIDIKOU-SEYNI et al (Plant Cell Tissue and Organ Culture (1992), vol. 29:83-91) ("SIDIKU-SEYNI") in view of TAN et al (HortScience (1990) 25(11):1396-1398 ("TAN") and the admitted prior art (the paragraph bridging pages 2 and 3 of the present specification; and page 3, 1st and 2nd full paragraph) and further in view of DELESALLE et al. US 6,803,497 B1 ("DELESALLE").

5. I understand that, according to the Office Action, the article of SIDIKOU-SEYNI would teach to the skilled person how to obtain F1 recombinant plants by crossing *Cichorium intybus*

with *Cichorium endivia*, and that the said skilled person would know how to obtain the further plant generations by "*selfing F1 hybrid plants and forcing the resultant F2 plants*" (See page 3 of the Office Action).

6. I respectfully disagree with the reasoning discussed above in item 5 because, as one of ordinary skill in the art of plant breeding, I would certainly not consider the F1 plants obtained by SIDIKOU-SEYNI as recombinant plants for the reasons that follow:

The fact that the *Cichorium intybus* and the *Cichorium endivia* species are distinct does in no way induce that the F1 plants are recombinant.

Indeed, for a plant breeder generally, and for the purpose of the present invention especially, a recombinant plant consists of a plant which genome is the result of genomic recombination of the genomes of the two parents.

As it is stated in the present specification, the F2 generation plants consist of recombinant plants "*which, after multiple recombination events between the DNA originating from Cichorium intybus and Cichorium endivia, possess a recombined geneome…*" (See page 8, line 31-35 of the present specification).

In other words, one chromosome of such a F2 recombinant plant contains DNA from each plant parent. Recombination between parent chromosomes occurs during meiosis, through chromosomes

crossing-over events, when the F1 plant produces gametes (pollen and ovules). An F2 plant, obtained from self fertilization of the F1 plant would then be considered as a recombinant plant, in contrast to the F1 plant that has not yet undergone the chromosome crossing-over events, which F1 plant consists of hybrid plant.

Thus, it flows that the genome of the F1 plant obtained by SIDIKOU-SEYNI consists of a hybrid plant bearing the addition of the genome of the parents, i.e. for each pair of chromosomes, a first chromosome derives from *Cichorium intybus* and a second chromosome derives from *Cichorium endivia*, but none of these first or second chromosomes has undergone a genetic recombination event between the two parental genomes.

As mentioned previously, an F2 plant obtained from self fertilization of the F1 plant would then be considered as a recombinant plant. This subject will discussed in further detail in reference to the admitted prior art, the Rick document and it will be demonstrated why one ordinary plant breeder would NOT be able to produce any generation hybrid plants without a recourse to the method of the present invention. Obtaining the F1 plant is rather easy, but generating plants of the further generations is much more difficult.

7. I also strongly disagree with the Office Action statement that according to which the one skilled in the art,

once the F1 hybrid plants would have been obtained, "*need not teach a method of selfing F1 hybrid plants and forcing the resultant P2 plants*" (See Page 3, end of first full paragraph of the Office Action).

8. The claimed invention does not simply involve implementing conventional breeding techniques comprising crossing and selection steps to the generation of the *Cichorium* recombinant plants. This is discussed in item 12 below.

Regarding the forcing step that is allegedly taught to the one skilled in the art, to my knowledge, a method for obtaining *Cichorium* recombinant plants comprising a forcing step has never been disclosed prior to the date when the instant invention was made.

Thus, contrary to the statement made in the Office Action, the inclusion of a forcing step in such a method cannot be taught to the one skilled in the art.

The introduction of a forcing step in a method for obtaining *Cichorium* recombinant plants, including the finding of the specific features of such a forcing step, was designed by me to solve specific growth and sanitary problems encountered with the F2 recombinant plants, as described in the present application. This discussed in further detail in item 12 below.

Incidentally, these technical problems could not, by definition, be recognized by SIDIKOU-SEYNI, which had not obtained F2 *Cichorium* recombinant plants.

9. I further understand that the Office Action takes the position that the forcing step absent from the breeding method disclosed by SIDIKOU-SEYNI would be taught by TAN, despite the fact that the features of the forcing step disclosed by TAN are distinct from those of the invention's method, since the one skilled in the art *"would be able to find the forcing conditions suitable for any vegetable species including Cichorium sp."* (See page 4, end of the first full paragraph of the Office Action)

More precisely, the Office Action states that TAN teaches a method for improving marketable yield and quality of hydroponically forced chicory using roots. Further the Office Action indicates that the forcing conditions used in TAN need not exactly be the same forcing conditions as recited in the claims because the cultivars or plants are not similar cultivars and at the time of filing of the application, one of ordinary skill in the art would be able to find the forcing conditions suitable for any vegetable species. As such, Tan shall overcome the deficiencies of SIDIKOU-SEYNI because it teaches that chicory plants have been cultured by forcing before the applications.

10. My understanding of the previously filed responses was not that it was said that forcing was unknown before my invention.

In fact, the forcing of chicory dates back of more than Tan. To my knowledge, the first document describing a forcing method dates back from 1850, where the chicory plants where grown in the ground, with a cover of soil, straw and a waterproof cover, in order to apply pressure to the developing chicon to get them to the right shape (See Figure 1 in the appended Annex).

Then, about 25 years ago, it has been found that modern Witloof chicory could be hydroponically forced, i.e. the roots are immerged in a nutrient solution under dark conditions in solution and room controlled temperatures. New varieties were specifically bred for this purpose. There is some discussion of the development of these new varieties in the first column of TAN.

TAN describes that growers could improve the quality of the products, even with modern varieties that are more adapted to hydroponic forcing, using compression through a polyurethane foam. In fact, TAN describes a process looking like a medium way between the modern way (hydroponic conditions) and the old fashion way (underground culture) of forcing chicory.

The Office Action noted that TAN teaches a method for improving marketable yield and quality of the forced chicory. However, I wish to underline that:

- the methods disclosed by TAN all consist of methods for cultivation of varieties, whereas

- the claimed invention uses a forcing step as a breeding step for breeding new varieties.

Indeed, the recombinant *Cichorium* plants obtained from my breeding process will have to undergo a forcing step for their subsequent cultivation, like the *Cichorium intybus* plants that are currently found on the market. However, the forcing step that will be performed for cultivating the *Cichorium* recombinant plants is distinct from the forcing step of the invention's method, which is performed for breeding purposes.

Indeed, the forcing step for cultivation purpose may well be done as disclosed by TAN or according to the generally known hydroponic conditions known to the skilled person, but this is only a cultivation step, different from the one claimed.

Contrary to the statements made in the Office Action, the claimed forcing conditions differ from the one by TAN, NOT because the plants are distinct from those used by TAN, but instead because the forcing step itself is different and pursues goals that completely differ from those of TAN. TAN provides forcing conditions in cultivation for improving chicory varieties while the claimed invention provides new and original forcing conditions for generating new, never created before, *Cichorium* recombinant plants.

The forcing conditions I especially designed for this purpose are very specific and directed to optimize the sanitary conditions of the *Cichorium* F2 recombinant plants during the breeding process, and, thus, they specifically overcome the problems I encountered when I tried to reproduce Rick experiments These problems are discussed in detail below as item 12.

I would also underline that the claimed forcing conditions would not be well adapted to the cultivation and development of chicons of chicory. The specific forcing conditions of the invention's method are only used for the breeding process.

11. I also understand that according to the Office Action the content of Rick would have motivated the one skilled in the art to obtain *Cichorium* recombinant plants of generations subsequent to F2, since Rick would regard the features of the F2 generation plants it discloses in a rather optimistic way (See page 5 of the Office Action).

According to the Office Action, the preliminary experiments performed by Rick would have motivated the one of ordinary skill in the art to produce F1 hybrids and subsequent generations from *Cichorium intybus* x *Cichorium endivia*. Further, the Office Action pointed out the paragraph where Rick indicated the much larger populations of the F2 and successive backcrosses to either parent would be grown.

12. I would first point out that I have never back-crossed the recombinant plants of any generation to one or the other *Cichorium intybus* or *Cichorium endivia* parent, but instead I have created a new type of plant by the claimed successive steps of self fertilization of the initial F2 recombinant plant. As such, the claimed invention does not attempt to transfer one or more characteristic(s) from *Cichorium intybus* to *Cichorium endivia* or vice-versa. Instead, the claimed invention creates new plants.

This said, I would like to explain the circumstances of the generation of the claimed invention as I created it:

I was of course aware of the document by Rick, and as such it was expressly cited in the present application.

At first, I tried to follow Rick's teachings. Obtaining the F1 hybrid plants through a crossing step between *Cichorium intybus* and *Cichorium endivia* was indeed as easy to obtain for me as it was for Rick.

However, when I started working on the recombinant plants, i.e. the F2 generation plants obtained from the self fertilization of the F1 hybrids, I started to encounter several problems. In fact, Rick already recognized these problems because he also obtained the F2 plants: On page 463, he mentioned that *"The mean germination percentages observed for the P2 was 13.7, indicating a greatly reduced viability of the F2 seeds"*. Also on

the plant, Rick saw a great variability in vigor (page 465) and a *"rather high proportion of weak plants"*.

When I tried to obtain F2 recombinant plants that were sufficiently developed and mature for producing gametes in view of generating F3 recombinant plants by self-fertilization of the F2 recombinant plants, I failed. I was not able to obtain any of such F3 recombinant plants, because all my F2 recombinant plants died. I repeated the experiment and always failed. All my plants died each time and Rick's teachings were of no further help.

I had to imagine a way to save my F2 recombinant plants, to have them maturing enough to be self fertilizable. The dying of my plants was caused by general weakness conditions and a high susceptibility to diseases, especially from *Sclerotinia sclerotiorum*. Chemicals were of no use at this level of infestation (See Figure 2 in the appended Annex), and I tried to change the growing conditions in order to improve the sanitary conditions of my plants.

After several unsuccessful attempts, I finally tried to combine a forcing step at specific, low temperature conditions with a step of in vitro cloning of the surviving F2 recombinant plants. Both steps were needed in the specific sequence order, the specific forcing step to maintain the weak, infested plants alive, not dying from *Sclerotinia sclerotiorum* disease, the in vitro cloning step to develop them in vitro, because their root

system was very poor and the plants would have died of such poor rooting and general weakness conditions.

The very same procedure needed also to be applied for the F3 recombinant plants, for generating the F4 recombinant plants. Otherwise and again I would have lost my F3 recombinant plants. At the F4 level, the recombinant plants have become healthy enough to move from one generation to the subsequent one without performing the specific forcing procedure disclosed in the present application.

As I have explained above, I really had to create a specific breeding process for obtaining the new plants of the present invention,

- firstly by using a forcing technique that was not, to my knowledge, used in the breeding steps of plants,

- secondly, by defining specific conditions for such forcing with the view of resisting to the infection by *Sclerotinia*, and

- thirdly, by adding an in vitro cloning step to develop the plants that would otherwise have died because of general weakness.

13. I also understand that the Office Action refers to DELESSALLE because of the teachings of the importance of *Cichorium intybus* and of *Cichorium endivia* varieties that would be pointed out therein. Thus, the position of the Office Action

is that DELESSALLE would have confirmed the desirability of novel *Cichorium* plants, which production would be easily performed by the one skilled in the art following the method taught by SIDIKOU-SEYNI, after its adaptation in view of the teachings of TAN (See page 6, last full paragraph of the Office Action).

More precisely, the Office Action also referred to DELESALLE who would teach *"the importance of various types of chicory and endive plants in Agricultural food industry"* and that *"male sterile plants are useful for the production of hybrid plants"*.

14. Being the breeder that brought to the European market the first hybrid chicory comprising cytoplasmic male sterility, I will of course agree with this statement, but I do not believe that this statement from the Office Action has anything to do with claimed invention.

Regarding the importance of chicory and endive plants in Agricultural food industry, I can also only concur, and this is one of the reasons I was interested in creating new plants, to offer more choice to our customers.

However, from the previous, it would appear clearly that from the wish to create new plants up to their creation, I had to work hard and to design a new and very specific breeding process, which novel process is distinct from any other breeding

process that I was aware of at the time the instant invention was made.

15. I declare that all statements made in this declaration of my knowledge are true and that all statements made on information and belief are believed to be true and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Signed at La Meiite France

Alain LECOMPTE

this 8th day of April 2009

ANNEX:

Figure 1 and Figure 2 referred to herein.